

WHAT IS CLAIMED IS:

1 1. A magnetic storage system, comprising:
2 a moveable magnetic recording medium;
3 an actuator disposed proximate to the moveable magnetic recording medium; and
4 a read head, coupled to the actuator, for reading data on the moveable magnetic
5 recording medium, the read head comprising
6 a spin valve structure including:
7 a ferromagnetic free layer structure that has a magnetic moment;
8 a ferromagnetic pinned layer structure having a magnetic moment;
9 a nonmagnetic conductive spacer layer between the free layer structure
10 and the pinned layer structure; and
11 an anti-ferromagnetic pinning layer coupled to the pinned layer
12 structure for pinning the magnetic moment of the pinned layer structure;
13 hard magnetic thin films disposed on both sides of the free layer structure; and
14 a hard bias seedlayer structure adjacent to at least a portion of the spin valve
15 structure, wherein the hard bias seedlayer structure comprises at least a layer comprising
16 silicon and a layer comprising chromium or chromium molybdenum.

1 2. The magnetic storage system of claim 1, wherein the anti-ferromagnetic
2 pinning layer further comprises a layer of platinum manganese.

1 3. The magnetic storage system of claim 1, wherein the hard bias seedlayer
2 structure further comprises a layer of tantalum adjacent the silicon layer.

1 4. The magnetic storage system of claim 3, wherein the layer of tantalum
2 adjacent the silicon layer further comprises equal thickness of the tantalum and silicon layers.

1 5. The magnetic storage system of claim 3, wherein the layer of tantalum
2 adjacent the silicon layer further comprises a tantalum layer with a thickness half a thickness
3 of the silicon layer.

1 6. The magnetic storage system of claim 3, wherein the hard bias seedlayer
2 structure further comprises a chromium alloy layer.

1 7. The magnetic storage system of claim 1, wherein the hard bias seedlayer
2 structure further comprises a layer of tantalum, silicon and chromium.

1 8 The magnetic storage system of claim 1, wherein the hard bias seedlayer
2 structure further comprises a layer of tantalum, silicon and chromium-molybdenum.

1 9. A magnetic storage system, comprising:
2 a read head, coupled to the actuator, for reading data on the moveable magnetic
3 recording medium, the read head comprising
4 a spin valve structure including:
5 a ferromagnetic free layer structure that has a magnetic moment;
6 a ferromagnetic pinned layer structure having a magnetic moment;
7 a nonmagnetic conductive spacer layer between the free layer structure
8 and the pinned layer structure; and
9 an anti-ferromagnetic pinning layer coupled to the pinned layer
10 structure for pinning the magnetic moment of the pinned layer structure;
11 hard magnetic thin films disposed on both sides of the free layer structure; and
12 a hard bias seedlayer structure adjacent to at least a portion of the spin valve
13 structure, wherein the hard bias seedlayer structure comprises at least a layer comprising
14 silicon and a layer comprising chromium or chromium molybdenum.

1 10. The magnetic storage system of claim 9, wherein the anti-ferromagnetic
2 pinning layer further comprising a layer of platinum manganese.

1 11. The magnetic storage system of claim 9, wherein the hard bias seedlayer
2 structure further comprises a layer of tantalum adjacent the silicon layer.

1 12. The magnetic storage system of claim 11, wherein the layer of tantalum
2 adjacent the silicon layer further comprises equal thickness of the tantalum and silicon layers.

1 13. The magnetic storage system of claim 11, wherein the layer of tantalum
2 adjacent the silicon layer further comprises a tantalum layer with a thickness half a thickness
3 of the silicon layer.

1 14. The magnetic storage system of claim 11, wherein the hard bias seedlayer
2 structure further comprises a chromium alloy layer.

1 15. The magnetic storage system of claim 9, wherein the hard bias seedlayer
2 structure further comprises a layer of tantalum, silicon and chromium.

1 16. The magnetic storage system of claim 9, wherein the hard bias seedlayer
2 structure further comprises a layer of tantalum, silicon and chromium-molybdenum.

1 17. A spin valve sensor, comprising
2 a spin valve structure including a ferromagnetic free layer, a ferromagnetic pinned
3 layer and an anti-ferromagnetic pinning layer;
4 hard magnetic thin films disposed on both sides of the spin valve structure; and
5 a hard bias seedlayer structure adjacent to at least a portion of the spin valve structure,
6 wherein the hard bias seedlayer structure comprises at least a layer comprising silicon and a
7 layer comprising chromium or chromium molybdenum.

1 18. The spin valve sensor of claim 17, wherein the pinning layer comprises
2 platinum manganese.

1 19. The spin valve sensor of claim 17, wherein the hard bias seedlayer structure
2 further comprises a layer of tantalum adjacent the silicon layer.

1 20. The spin valve sensor of claim 19 wherein the layer of tantalum adjacent the
2 silicon layer further comprises equal thicknesses of the tantalum and silicon layers.

1 21. The spin valve sensor of claim 19, wherein the layer of tantalum adjacent the
2 silicon layer further comprises a tantalum layer with a thickness half a thickness of the
3 silicon layer.

1 22. The spin valve sensor of claim 19, wherein the hard bias seedlayer structure
2 further comprises a chromium alloy layer.

1 23. The spin valve sensor of claim 17, wherein the hard bias seedlayer structure
2 further comprises a layer of tantalum, silicon and chromium.

1 24. The spin valve sensor of claim 17, wherein the hard bias seedlayer structure
2 further comprises a layer of tantalum, silicon and chromium-molybdenum.

1 25. A read sensor, comprises: /
2 means for providing a spin valve structure, means for providing a spin valve structure
3 further comprising:
4 means for providing a ferromagnetic free layer structure that has a magnetic
5 moment;
6 means for providing a ferromagnetic pinned layer structure having a magnetic
7 moment;
8 means for providing a nonmagnetic conductive spacer layer between the
9 means for providing a ferromagnetic free layer structure and the means for providing a
10 ferromagnetic pinned layer structure; and
11 means for providing an anti-ferromagnetic pinning layer coupled to the means
12 for providing a pinned layer structure for pinning the magnetic moment of the pinned layer
13 structure;
14 means for providing hard magnetic thin films adjacent to at least a portion of the
15 means for providing a spin valve structure; and
16 means for providing a hard bias seedlayer structure adjacent the at least a portion of
17 the means for providing a spin valve structure, wherein the means for providing a hard bias
18 seedlayer structure comprises at least a layer comprising silicon and a layer comprising
19 chromium or chromium molybdenum.

1 26. A spin valve sensor, comprising /
2 means for providing a spin valve structure including free means, pinned means and an
3 pinning means;
4 means for providing hard magnetic thin films in an abutting relationship with the
5 means for providing a spin valve structure on both sides of the means for providing a spin
6 valve structure; and
7 means for providing a hard bias seedlayer structure adjacent the means for providing
8 a spin valve structure, wherein means for providing the hard bias seedlayer structure
9 comprises at least a layer comprising silicon and a layer comprising chromium or chromium
10 molybdenum.

1 27. A hard bias seedlayer structure adjacent a pinning layer structure, the /
2 seedlayer structure comprising at least a layer comprising silicon and a layer comprising
3 chromium or chromium molybdenum.

1 28. The seedlayer structure of claim 27, wherein the seedlayer structure further
2 comprises a layer of tantalum adjacent the silicon layer.